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09/874,999	06/07/2001	Ian Edward Day	SGU-43	5528

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EXAMINER

KIANNI, KAVEH C

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 04/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/874,999

Applicant(s)

DAY, IAN EDWARD

Examiner

Kevin C. Kianni

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17 is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Allowable Subject Matter*

1. Claim 17 is allowable because the prior art, in combination with other limitations of the base claim, does not teach wherein the waveguide comprises a series of two or more curved portions curving in alternating directions, each having an n-doped region adjacent the outer side of the curved portions and a p-doped region of the inner side thereof so as to form a series of diodes of alternating polarity along the length of the waveguide.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6 and 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Streifer et al. (US 4624000).

Regarding claim 1, 6, 8-11, Streifer teaches a substrate 12 (shown at least in fig. 4, item 2); and an integrated optical waveguide 16 extending across the substrate 12 (shown in fig. 4, item 16), and means arranged to apply an electrical signal across the waveguide via two doped regions (see fig. 7, items doped regions 32-42 and col. 9, lines 1-16) to alter properties and/or a refractive index of the waveguide by altering the density of charge carriers within the waveguide (see col. 8, lines 18-44), the doped

regions each comprising a plurality of doped areas spaced apart from each other in a direction parallel to the length of the waveguide (see at least fig. 6, 7 and 8, items spaced apart doped areas in doped regions such as 58, 60, 34, 36 and 98) the size and spacing of the doped areas being selected so that the efficiency of the device, in terms of the increase in property change or change in refractive index per unit current applied thereto, is increased (see col. 8, lines 18-44). Streifer further teaches wherein the doped regions form p-i-n diodes across the waveguide (see at least fig. 6, items 52-62 p-i-n diodes 58a); wherein the waveguide comprises silicon (col. 12, line 20); wherein the waveguide is a rib material waveguide; wherein the two doped regions are provided on opposite sides of the waveguide; wherein the doped regions are provided in areas of adjacent the rib waveguide (see fig. 4-8 items rib waveguide with different doped materials).

However, Streifer does not specifically teach wherein the above property change is attenuation or change in attenuation of waveguide and that the above rib material is rib silicon. Nevertheless Streifer states that other semiconducting material are also used in producing waveguides such as silicon carbide (Si) (see col. 12, lines 16-24). It is well known to those of ordinary skill in the art that change in properties of waveguide such as change in refractive index waveguide is known as change in attenuation of waveguide; and it has been obvious to those of ordinary skilled in the art when the invention was made to alter Streifer's waveguide rib from that of a silicon rib-- instead of SiC—since resultant change in properties of the waveguide provides shifting the gain relative to the optical guide of the laser emitters so that such laser structure will

continuously operate in the preferred supermode (col. 3, line 66-col. 4, line 2) and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 2-4, Streifer teaches all limitations of claim 1. However, Streifer does not specifically teach wherein the spacing between adjacent doped areas is in the range of 250 to 300 microns and wherein each of the doped areas has a length in a direction along the waveguide of at least 1 mm, and wherein each of the doped areas has a length in a direction along the waveguide of 10 mm or less. Nevertheless, Streifer with regard to planer waveguides (see doped layers with different thickness in at least fig. 4) states that the width and the length of the waveguide layers are variable in which different thickness/lengths as desired can be grown in a planar waveguide (see col. 2, lines 44-56 and col. 8, lines 7-29). Therefore, it would have been obvious to a person of ordinary skill in the art, when the invention was made to modify Streifer's phase modulating device as to achieve a desired length or size of optical components, since such modification would provide supermode operation with preferred radiation in a single lobe (col. 4, lines 5-13) and since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

Regarding claim 5, Streifer further teaches wherein the doped regions each comprise at least four doped areas spaced part from each other in a direction along the length of the waveguide (see fig. 6, items spaced apart doped areas in 58 and 60 doped regions).

Regarding claim 12-15, Streifer further teaches wherein the waveguide has a substantially straight portion (fig. 6, at least items 52-62); and the doped regions are arranged so that the density of charge carriers can be altered within said substantially straight portion of the waveguide (col. 8, lines 18-45); wherein the doped areas are electrically connected so a plurality of diodes formed thereby are connected in series (see fig. 6, items 58A); wherein electrical connections to and/or between the doped areas are provided by electrical contacts 64; wherein the device is used as an adjustable attenuator (see abstract and col. 8, lines 18-45 and also col. 1, lines 35-46).

Regarding claim 16, Streifer further teaches wherein the device is used as a phase modulator (see abstract).

4. Claims 7 rejected under 35 U.S.C. 103(a) as being unpatentable over combination of Streifer and May (US 4997246).

Regarding claim 7, Streifer teaches all limitations of claim 6. However, Streifer does not specifically teach wherein the doped areas are arranged in an alternating sequence of p-doped areas and n-doped areas along the length of the waveguide. This

limitation is taught by May (see also US 4,701,774 provided herein as prior art). May teaches an electro-optic device that includes the above limitation (see fig. 3, item 58). Thus, May provides a modulator that is amenable to fabrication with VLSI circuits (col. 3, lines 21-24). Thus, it would have been obvious to person of ordinary skill in the art when the invention was made to modify Streifer's waveguide layers 10, with that of May's waveguide structure 58 in order to produce an electro-optic device that includes the above limitations. Since the resultant optical device would modulate light transmitted in a semiconductor waveguide that includes phase modulation (col. 4, lines 14-33).

#### ***Citation of Relevant Prior Art***

5. Prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In accordance with MPEP 707.05 the following references are pertinent in rejection of this application since they provide substantially the same information disclosure as this patent does. These references are:

McIlroy et al. 4701774

These references are cited herein to show the relevance of the apparatus/methods taught within this reference as prior art.

#### ***Response to Amendment***

6. Applicant's arguments filed on March 28, 2003 have been fully considered and, thus, in response to applicant's amendments and arguments, the examiner has provided a new reference to overcome the applicant's arguments.

**THIS ACTION IS MADE FINAL**

7. This action in response to applicant's amendment made FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



**Contact Information**

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaveh Cyrus Kianni whose telephone number is (703) 308-1216. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 6:00 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font, can be reached at (703) 308-4881.

**Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks  
Washington, D.C. 20231

**or faxed to:**

(703) 308-7722, (for formal communications intended for entry)


**or:**

(703) 308-7721, (for informal or draft communications, please label  
"PROPOSED" or "DRAFT")

Hand delivered responses should be brought to Crystal Plaza 4, 2021 South  
Clark Place, Arlington, VA., Fourth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956.

Kevin Cyrus Kianni  
Patent Examiner  
Group Art Unit 2877

  
Frank Font  
Supervisory Patent Examiner  
Group Art Unit 2877

April 14, 2003